Request to Archive
With The National Centers for Environmental Information
For NOAA MSU/AMSU Mean Layer Temperature
Provided by NESDIS/STAR

2015-01-27

This information will be used by NCEI to conduct an appraisal and make a decision on the request.

1. Who is the primary point of contact for this request?

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2. Name the organization or group responsible for creating the dataset.

The MSU/AMSU/SSU reprocessing group at NOAA/STAR

3. Provide an overview summarizing the scope of data you want to archive. Describe the outputs, data variables, including their measurement resolution and coverage.

Consistent deep layer atmospheric temperature records derived from microwave sounding unit (MSU) and Advanced Microwave Sounding Unit (AMSU) on board multiple NOAA, NASA, and European MetOp polar-orbiting satellites are critical for detecting upper atmosphere temperature trend during 1978-present. However, generation and usage of such data records are constrained by inaccurate sensor data such as calibrated radiances.

Based on the post-launch simultaneous nadir overpass (SNO) matchups, Zou et al. (2006, 2009, and 2010, 2011) have developed an Integrated Microwave Inter-Calibration Approach (IMICA) to remove/minimize instrument calibration errors in the satellites. The algorithm has been thoroughly validated, and inter-calibrated level-1C radiances have been distributed at National Climatic Data Center (NCDC) as a Fundamental Climate Date Record (FCDR).

Using the inter-calibrated FCDR, we have further adjusted the radiance data for limb-effect, diurnal drift effect, removal of residual inter-satellite biases, and then produced gridded, merged layer temperature TCDR for 1978-present. The algorithm and the dataset have been well tested, and the product is sufficient mature to be submitted to the NOAA CDR Program Office for operational assessment.

The data to be archived include layer temperatures for the mid-troposphere (TMT), upper-troposphere (TUT), and lower-stratosphere (TLS). They are monthly data in 2.5 latitude by 2.5 longitude spatial resolution with global coverage. The data covers period from October 1978 to present. All products are in NetCDF format which meet the requirements of NetCDF Metadata Guidelines for IOC Climate Data Records.

4. What is the time period covered by the dataset? (YYYY-MM-DD, YYYY-MM or YYYY)

From 1978-10-13
Ongoing as continuous updates to the data record

5. Edition or version number(s) of the dataset:

Version 3.0 of NOAA/STAR MSU/AMSU atmospheric layer temperature dataset

6. Approximate date when the dataset was or will be released to the public:

2014-06-01

7. Who are the expected users of the archived data? How will the archived data be used?

1. climatologists who analyze past climate trend and variability
2. climate modelers who use satellite temperatures to validate model simulations
3. IPCC report
4. Satellite TCDR developers who use the data to validate/inter-compare with their own datasets
5. General public who are engaged in global warming debate
6. Decision makers who need climate change information to make informed decisions on climate adaptation and mitigation

8. Has the dataset undergone user evaluation and/or an independent review process? Did NCEI participate in design reviews?

The dataset were compared to radiosonde observations by independent users and favorable comparison results were obtained. These results were also published.

9. Describe the dataset's relationship to other archived datasets, such as earlier versions or related source data. If this is a new version, how does it improve upon the previous version(s)?

It is derived from IMICA inter-calibrated MSU and AMSU level-1c radiance dataset currently distributed at NCDC CDR website. More adjustments to the IMICA radiances such as diurnal drift, limb-effect, channel frequency differences between MSU and AMSU, residual inter-satellite bias removal were conducted to develop the layer temperature dataset.

10. List the input datasets and ancillary information used to produce the data.

IMICA inter-calibrated MSU/AMSU Level 1C brightness temperatures and warm target temperatures are required as inputs for producing the merged level-3 temperature datasets. A set of ancillary data including diurnal anomaly dataset, limb correction coefficient, channel frequency correction dataset, land-sea mask, and surface elevation, are also required and will be provided to produce the dataset.

11. List web pages and other links that provide information on the data.

The metadata include two types: 1. peer-reviewed publications and C-ATBD help users to understand the methodology, key datasets used, and all scientific information for generating and characterizing the precision and uncertainty of the datasets. 2. Comments within the source code to help the processors/programmers to be able to run the source code and scripts to reproduce the results. All the metadata were provided to comply with international standards

12. List the kinds of documents, metadata and code that are available for archiving. For example, data format specifications, user guides, algorithm documentation, metadata compliant with a standard such as ISO 19115, source code, platform/instrument metadata, data/process flow diagrams, etc.

1. C-ATBD: Zou, C.-Z., J. Li, (2015) NOAA MSU/AMSU-A Mean Layer Temperature, Climate Algorithm Theoretical Basis Document
   Data Process Flow Chart
   Dataset Maturity Matrix
   Source code

2. Zou, C.-Z., et al. (2006). Recalibration of microwave sounding unit for climate studies using simultaneous nadir overpasses. Journal of Geophysical Research, 111(D19), D19114
3. Zou, C.-Z., M. Gao, M.Goldberg, 2009, Error structure and atmospheric temperature trends in observations from the Microwave Sounding Unit, J. Climate, 22, 1661-1681, DOI: 10.1175/2008JCLI2233.1
4. Zou, C.-Z., W.Wang (2010). Stability of the MSU-derived atmospheric temperature trend. Journal of Atmospheric and Oceanic Technology, 27(11), 1960-1971
5. Zou, C.-Z. and Wenhui Wang (2011), Inter-satellite calibration of AMSU-A observations for weather and climate applications, J. Geophys. Res., Vol. 116, D23113, DOI:10.1029/2011JD016205

13. Indicate the data file format(s).

1. netCDF-4

14. Are the data files compressed?

netCDF-4/HDF5 compression

15. Provide details on how the files are named and how they are organized (e.g., file_name_pattern_YYYYMM.tar in monthly aggregations).

There may have two options for file organization. The first one is that each file covers the same product for the entire time period. In this case, there are only three files to be archived which are
NESDIS-STAR_TCDR_MSU_AMSUA_V03R00_TLS_S197811_E201412_C20150123.nc
NESDIS-STAR_TCDR_MSU_AMSUA_V03R00_TMT_S197811_E201412_C20150123.nc
NESDIS-STAR_TCDR_MSU_AMSUA_V03R00_TUT_S198101_E201412_C20150123.nc

Each of the above files contains global gridded monthly data from Oct 1978 (Jan 1981 for TUT) to the latest month (note the end month E201412 and creation month C20150123 may change, depending on dates of the latest update). During the update after the initial delivery, new data for the latest month will be added to the file and the updated file will be delivered to NCDC each month. STAR prefers this option since the files structure is simple.

The second option is to divide the dataset for each product into multiple files, each covering shorter period of time, for instance, one file for each month or one year. In this case, each update will only need to deliver the data of the latest month or the latest year. The advantage of this option is that each update delivers only a small dataset, but its disadvantage is that data structure become complicated.

16. Explain how to access sample data files and/or a file listing for previewing. If it is not available now, when will it be available?

Sample data in netCDF has been sent to NCDC through email.
The same sample data in ascii format can also be found in
ftp://ftp.star.nesdis.noaa.gov/pub/smcd/emb/mscat/data/MSU_AMSU_v3.0/Monthly_Atmospheric_Layer_Mean_Temperature/

17. What is the total data volume to be submitted?

Historic Data: all historic data or data submitted as a completed collection.

Total Data Volume: 60MB
Number of Data Files: 3

Continuous Data: data volume rate for a continuous data production.

Total Data Volume Rate: 20KB per Month
Data File Frequency: 3 per Month

Data Production Start: 2015-01

18. Are later updates, revisions or replacement files anticipated? If so, explain the conditions for submitting these additional data to the archive.

The dataset will be updated each month, which adds the monthly-mean, inter-calibrated and well-merged AMSU-A layer mean temperature from the latest month to the dataset.

19. Describe the server that will connect to the ingest server at NCEI for submitting the data.

Physical Location: College Park, Maryland
System Name: ftp2.star.nesdis.noaa.gov
System Owner: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
Additional Information:

20. What are the possible methods for submitting the data to NCEI? Select all that apply.

1. FTP PULL

21. Identify how you would like NCEI to distribute the data. Web access support depends on the resources available for the dataset.

1. Direct download links

22. Will there be any distribution, usage, or other restrictions that apply to the data in the archive?

Constraint Type	Description
Use	The users of the software and datasets should acknowledge and cite the NESDIS/STAR/AMSU reprocessing team in their publications, presentations, and/or any derived data products that were produced using the original data set.

23. Discuss the rationale for archiving the dataset and the anticipated benefits. Mention any risks associated with not archiving the dataset at NCEI.

The MSU/AMSU data record provides key information on upper-air temperature change. However, different processing by different groups resulted in different climate trends. The current data version was derived from the most advanced, IMICA calibrated MSU/AMSU level-1c radiance datasets which produced potentially the most reliable climate trend information. Archiving this dataset ensures the public to have a balanced view on the climate trend from the MSU/AMSU measurement

24. Are the data archived at another facility or are there plans to do so? Please explain.

The data is currently archived at the NOAA/STAR website for the MSU/AMSU reprocessing project under the name 'Microwave Sounding Calibration and Trends (MSCAT)'. Its URL address is ftp://ftp.star.nesdis.noaa.gov/pub/smcd/emb/mscat/data/MSU_AMSU_v3.0/Monthly_Atmospheric_Layer_Mean_Temperature/

25. Is there an existing agreement or requirement driving this request to archive? Have you already contacted someone at NCEI?

There is an existing 'Work Agreement' between NCDC CDR Program and the STAR MSU/AMSU Processing Team which requires the later team to transition this MSU/AMSU TCDR product to NCDC CDR program in the period from

July 2014 to June 2015.

26. Do you have a data management plan for your data?
No

27. Have funds been allocated to archive the data at NCEI?
NCDC has funded the processing team in FY14 to transition this product to NCDC CDR program

28. Identify the affiliated research project, its sponsor, and any project/grant ID as applicable.
The project was supported by NCDC CDR program under the grants ID:
NESDIS-NESDISPO-2009-2001589

with project ID: SDS-09-15

29. Is there a desired deadline for NCEI to archive and provide access to the data?
Archive by: 2015-04-30
Accessible by:

30. Add any other pertinent information for this request.
None